

Name _____

Homework 12

Section 4.1

1. (6) The function $f(x) = \frac{1}{6}x^6 - 2x^5 + \frac{13}{2}x^4 + \frac{16}{3}x^3 - \frac{123}{2}x^2 + 90x + 42$ has critical numbers at $x = -2, 1, 3, 5$. Use the First Derivative Test to determine where the relative extrema of $f(x)$ occur (that is, at what x values).

• $f(x)$ has (a) relative maximum/maxima at $x =$ _____

• $f(x)$ has (a) relative minimum/minima at $x =$ _____

2. (6,2) A company finds that their profit (in thousands of dollars) from manufacturing x items can be modeled by $P(x) = \frac{2}{3}\sqrt{-x^3 + 15x^2 - 48x + 60}$ for $0 \leq x \leq 11$.

(a) How many units should the company produce in order to maximize their profit?

(b) What is the company's maximum profit? (Round to the nearest dollar)

3. (6) Suppose that the cost function to produce x items is $C(x) = 0.003x^3 + 4x + 4374$. Find the production level (value of x) that will result in the minimum average cost per unit.